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LANCASTER LABORATORIES, INC.

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Agricultural Products Research, Development and Testing

July 28, 1967

Mr. Robert Gawthrop Jr.
Attorney-at-Law
Gawthrop and Greenwood
119 North High Street
West Chester, Pa.

Dear Mr. Gawthrop:

Several analyses were conducted on a composite sample of chemical waste obtained from number 1 and 2 chemical dumping lagoons situated on a property in West Caln Township owned by Mr. William Dick. The sample which was obtained and delivered by Mr. Clifford Myers, West Caln Township Supervisor and Mr. Morris Holman Jr. of the Lehman Trucking lines was analyzed at the request of Mr. Dick and yourself.

I Chemical Characterization of Sample

A general chemical characterization of this specimen as an industrial waste was conducted as outlined in our report of August 12, 1966. The results of these tests appear in table I below.

Table I
Chemical Characterization

Test	Value
pH	6.0
Acidity*	2.3
Total Solids **	5710
Total Inorganic Solids	4920
Total Organic Solids (by difference)	790

* expressed as meq. of sodium hydroxide required to bring 1 liter of sample to the phenolphthalein end point (pH 8.6)

** All values in remainder of table expressed as parts per million (ppm)

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The following interpretations are offered concerning these data. The aqueous phase of the material exhibits low to moderate acidity, as reflected by the pH (neutral pH = 7.0) and the small amount of alkali required to raise the pH to the phenolphthalein end point. This level of acidity, which shows a twofold decrease over last year's analysis, is not regarded as a hazard since many wells and springs have much lower pH readings. The total solids content of the material is quite high. Expressed on a percentage basis the value is 0.5% of the total sample. The next determination revealed that about 85% of the total solids content is inorganic in nature with the remaining 15% solids being composed of organic matter.

The final chemical analysis was conducted on a sample of the "tunker oil" which was skimmed off the surface of the milky emulsion and then filtered. The "tunker oil" was dried over anhydrous sodium sulfate for 1 week after which an Infra-red spectrum was obtained. The Infra-red spectrum obtained this year is very similar to the one obtained last year and a photocopy is attached to this report.

II Biological Tests

Biological tests were carried out with the sample using procedures as outlined in our previous report of August 12, 1966.

A. Microbic Toxicity

Standard bacteriological analysis revealed a plate count in excess of 100,000 microorganisms per milliliter of lagoon waste. This result is in sharp contrast to last year's samples which were essentially sterile. The difference in chemical composition which is likely responsible is the pH factor, since bacteria grow much more readily in a neutral pH than under acid conditions.

B. Fish Toxicity Test

Three Guppies (1 male and 2 females) were placed into each of five fish bowls containing 15,000 ml quantities of conditioned tap water and were allowed to condition for a four day period. After the conditioning period a portion of the milky emulsion was added to each of the bowls so as to provide the following concentrations of lagoon material:

<u>Bowl number</u>	<u>Concentration (ppm)</u>
5	0
4	10
3	100
2	1,000
1	10,000

The fish were observed for 2 weeks after addition of the test material. Three fish died during this test; one female in bowl 3 after 2 days exposure, one female in bowl 1 after 6 days and 1 male in bowl 2 after 10 days exposure. None of the fish in bowls 4 and 5 or in the large holding tank from which the test fish were taken died during the 14 days that the test was in progress. It must therefore be concluded that the lagoon waste did contain some substance(s) showing a degree of toxicity to the Guppies.

C. Mouse Test

Four separate cages were stocked with two small white mice, each of which was conditioned for a period of three days using a standard laboratory diet and tap water as their water source. At the end of the conditioning period one pen was retained as the control group, while the other 3 groups were fed the same laboratory feed, but various concentrations of the lagoon waste dispersed in their drinking water. One pen received a 0.1% solution, the second pen a 1.0% solution and the last pen a 10% solution of the sample. The test was conducted for 2 weeks during which time four of the mice, one in each pen (including the control) died. The first mouse died 24 hours after the test was initiated and was one of those drinking the water containing 10% lagoon waste. Five days later two more mice died, one which had been drinking the 0.1% mixture and the other which had been drinking the 1% mixture. Seven days after the test began one of the mice in the control pen died. It was concluded that the results were not reliable, due to the possibility of having begun the test with mice already weakened by unknown factors. In view of these inconclusive results a second test was performed. It was conducted in the same manner as that previously described except that the mice were considerably larger, and were very robust. Three specimens were placed in each pen. Although the water consumption at the high level of adulteration was definitely decreased when compared to the control, none of the experimental mice showed the slightest physiological abnormality as a result of drinking the contaminated water for 2 weeks. It is concluded therefore, as a result of this latter mouse feeding test, that the lagoon waste lacks any significant ingredient(s) toxic to mice.

III Conclusions

Although the test results will undoubtedly provide, in the minds of some people, conflicting evidence as to the hazard presented by the lagoons, an objective examination of the data indicates that the lagoons do not represent a hazard to the ground water supply of the neighboring area. The results of the chemical analyses indicate that the solids content of the lagoons has remained unchanged, with the inorganic and organic portions present in essentially the same proportion. The total acidity has been reduced significantly from a pH of about 4.2 to 6.0, which is closer to the neutral point of pH 7. The results of a bacteriological analysis revealed the microbial content to be in excess of 100,000 per milliliter of lagoon waste. It is concluded on the basis of this evidence that the lagoon contents are not toxic to microbial life. The results of the fish toxicity test indicate the presence of some toxic substance that might be harmful to aquatic life. However the magnitude of toxicity is only marginal at present. The results of the mouse toxicity test indicated no harmful effects as a result of their having drunk water containing as much as 10 percent lagoon waste. It therefore must be concluded that the lagoon waste does not contain, at present, any toxic material that is likely to be harmful to animal life. Although tests do not show the presence of dangerous chemicals as of June 14, 1967, a continued program of regular checks is suggested, so as to minimize the possibility of future hazard to the community.

Respectfully Submitted,

LANCASTER LABORATORIES, INC.

Earl H. Hess

Earl H. Hess, Ph.D.
President

EHH:jr
Enclosure

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